

and the nature of the surface makes the search for evidence difficult and inconclusive.

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FLORA OF THE MUD ISLANDS, PORT PHILLIP BAY.

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INTRODUCTION.

Although the Mud Islands were visited as early as 1803, no one seems to have made any record of the flora until Mr. A. G. Campbell paid a visit on December 27, 1906. Mr. Campbell's list of species was published by A. H. E. Mattingley in the *Victorian Naturalist* XXIV, 12 (May, 1907); it included 20 indigenous plants and 3 naturalized aliens, but no cryptogams. Mr. Mattingley mentions two other plants, viz. *Halophila ovalis* and *Mesembryanthemum aequilaterale*, not listed by Campbell.

By courtesy of the Director, National Museum, Melbourne, the writer was enabled to visit this area on November 30, 1945. Only four hours were spent ashore; but in that time he walked completely around the island group, at the same time traversing most of some 200 acres that remain permanently above high tide level. The vascular flora was increased to 30 native and 10 introduced plants, and, although ten of Campbell and Mattingley's recordings were not observed on this occasion (these are indicated by smaller type in the catalogue that follows), 9 indigenous flowering plants, 7 alien weeds, 9 lichens and 5 mosses were added to their list.

PRINCIPAL PLANT COMMUNITIES

Mud Islands vegetation displays no feature of unusual interest and is, as might be expected, almost identical with that of the neighbouring coastline—e.g. Swan Island, Queenscliff, just over

five miles away to the west. Four distinct plant communities are recognizable and will now be discussed briefly:

1. *Sand Dune.*

The long narrow Western Island consists of blown sand which, on the northern and southern extremities, is piled into small but stable dunes (to 12 feet high) supporting the only arboreal growth in the area. Old be-liehened trees of *Leucopogon parviflorus* ("Coast Beard-heath") at the northern tip form a tiny unmixed woodland, some 8 or 9 feet tall—apparently the climax community on dune sand. Seven different lichens and three mosses were found on the trunks and branches of these venerable trees, beneath which is an accumulation of leafy litter. The south-western point not only supports a group of *Leucopogon* trees (fewer than at the north end) but also the only occurrence (now) of *Acacia sophorae* ("Coast Wattle") in the islands.

Erect wiry *Scirpus nodosus* ("Knotted Club-rush") and herbaceous annual *Anagallis arvensis* (the introduced "Scarlet Pimpernel") are conspicuous over much of this sand formation, also such pygmy ephemerals as *Sagina apetala*, *Polycarpon tetraphyllum*, *Tortella calycina* and *Ceralodon purpureus* (the last two being mosses). *Scirpus nodosus* is an effective sand-binder and has doubtless contributed to the stabilization of the dunes.

The pioneer strand grass *Spinifex hirsutus* was not noted anywhere here—a singular fact, as it is so abundant in many parts of Port Phillip and outside the Heads, wherever cliffs give place to a low sandy shoreline. *Tetragonia expansa*, *Mesembryanthemum aequilaterale*, and *Cakile maritima* are succulent species mentioned in Mr. Mattingley's account as examples of the sand dune vegetation; but I did not see any of these edible plants in 1945 and suggest that rabbits may have been responsible for their disappearance.

There is evidence of some encroachment by the sea upon the northernmost dune and its *Leucopogon* woodland, for dead trees with bared roots are to be seen standing in the water at some distance from the present dune face. It is most probable that such erosion has exterminated at least three shrub species: the dune composites *Olearia axillaris*, *Helichrysum cinereum*, and *Calocephalus Brownii* were recorded for the north-west on Campbell's 1906 list, but I failed to find them after a careful search.

2. *Salt Marsh*

The low southern Boatswain's Island, "leg of mutton" shaped and surrounded by shallow waters of the central lagoon, is appar-

ently the most stable part of the region; its outline and area have not changed appreciably since 1860 (*q.v.* Admiralty chart). Except for a few patches of blown sand facing the south-western dunes across the lagoon, this area consists wholly of black mud which is densely covered with *Arthrocnemum arbusculum* ("Shrubby Glasswort," to 5 ft.)—the dominant species—in various mixture with *Suaeda maritima*, *Atriplex paludosa*, *Salicornia australis*, *Frankenia pauciflora* and *Samolus repens*, the last being abundant throughout. The salt marsh presents a rather drab and monotonous aspect; the waterlogged soil, supporting such a thick mantle of chenopodiaceous and other small shrubs, is rich in organic matter. Again, in this community one misses such characteristic halophytes as *Disphyma australis*, *Pratia platycalyx* and *Selliera radicans* which are common plants of the salt marsh association in other parts of Port Phillip and in Westernport Bay.

The ground is honeycombed with Storm Petrel burrows, where patches of the marsh growth have been covered by drift sand, and in these situations two weeds have taken possession: *Anagallis arvensis* ("Scarlet Pimpernel") forms an almost continuous carpet, while *Cucumis myriocarpus* ("Gooseberry Cucumber") is also abundant and perhaps of more recent introduction—Campbell did not observe it in 1906. The sole living, and very aged, tree of *Myoporum insulare* ("Boobialla") is to be found on this, Boat-swain's Island, near a sandy rise; sprawling shrubs of *Atriplex cinerea* ("Coast Saltbush") also favour such higher parts of the marsh, their branches often encrusted with the vivid orange lichen *Teloschistes parietinus*.

3. Raised Shell Beds.

Practically the whole eastern section of the group consists of accumulated shells or shell-grit with a very sparse plant cover. Isolated clumps of *Atriplex cinerea* and *A. patula* (introduced annual) comprise almost the entire flora in the north-east, i.e. beyond Middle Island; but at the south-eastern extremity, several other annuals appear among the two saltbushes, viz., *Pholiurus incurvus*, *Melilotus indica* and *Sonchus oleraceus*.

It is convenient to class with the shell-beds a few acres of guano (formerly exploited) at the north-east, which carries an entirely alien flora—doubtless the result of man's interference. The dominant weeds here are *Urtica urens* ("Common Nettle"—very abundant) and *Anagallis arvensis*. *Cerastium glomeratum* and the two grasses *Poa annua* and *Vulpia bromoides* occur in a very

depauperate condition, while the rock-like guano itself is covered by the crustaceous lichens *Lecanora umbrina* and *Candelariella vitellina*.

4. *Shallow Water.*

In the lagoon and shallows, especially at the northern end of the group, is an association of aquatic phanerogams consisting for the most part of *one* species, *Zostera muelleri* ("Dwarf Grass-wrack")—the food of water birds. *Z. tasmanica* also occurs at the north and, apparently, *Halophila ovalis* in deeper water, though I did not see it.

GENERAL NOTES

In addition to the four well-defined communities just mentioned, one can distinguish certain transitional elements along their respective borders—e.g. *Stipa teretifolia* of the dunes occurs sparingly on raised shell beds, while *Atriplex cinerea* of the latter formation enters the dunes; *Suaeda maritima* and *Salicornia Blackiana* migrate from their typical marsh habitat out on to the shelly beds, the latter species appearing to favour drier ground than its congener *Salicornia australis*; the three weeds *Urtica*, *Anagallis* and *Cucumis*, while more abundant on guano, also extend out into the dunes. It would be interesting to tabulate the occurrences of all these species again after another period of, say, 40 years and note any changes in local distribution. Indeed, the Mud Islands, so circumscribed and relatively free from interference, would form an admirable subject for a detailed ecological survey.

Chenopodiaceae is by far the largest natural assemblage, both in species (8) and individuals; this family and the *Gramineae* (5 species) together account for 43 per cent of the islands' original flora (30 spp.). The number of indigenous species per genus is 1.1, and of species per family 2.1. (N.B., Dr. R. T. Patton also obtained the former figure in his studies on Salt Marsh flora—*q.v.* *Proc. Royal Soc. Vict.* LVI, p. 134, 1942). Systematically, the naturalized alien plants now constitute exactly a quarter of the flora, but none of the ten species seems to be aggressive or likely to threaten the existence of any plants native to the area.

Extensive sand banks with very shallow water are not conducive to a rich algal flora and, indeed, the shores of Mud Islands seem deficient in marine algæ. The attractive calcareous *Acetabularia peniculus* was noted (washed ashore on the backs of shells), also several *Caulerpa* species; but no attempt was made to catalogue any marine algæ for this small area.

SYSTEMATIC ARRANGEMENT.

(Alien plants indicated by an asterisk*; species not noted in 1945, by smaller type.)

- FLOWERING PLANTS.**
- POTAMOGETONACEAE**
Zostera
Muelleri Irmisch.
 (Syn. *Z. nana* Roth.)—Aquatic.
tasmanica Martens — Aquatic.
 (north).
- HYDROCHARITACEAE**
Halophila
ovalis (R.Br.) Hk.f.—Aquatic.
- GRAMINEAE**
Distichlis
distichophylla (Labill.) Fassett. (not
D. spicata (L) Greene)—S.W. area.
Poa
 **annua* L.—Guano (depaup.).
poaeformis (Labill.) Druce (Syn.
P. Billardieri Hk.f.)—S.W. area.
 **Vulpia*
bromoides (L) S. F. Gray—Dune,
 Guano (depaup.).
Stipa
teretifolia Steud.—Dune Shell.
Danthonia
penicillata (Labill.) F. v. M.
 (? in bud only)—Dune.
Pholurus
incurvus (L) Schlnx et Thell.—
 Shell (S.E.).
- CYPERACEAE**
Scirpus
nodosus Rottb.—Dune (common
 in S.W.)
- URTICACEAE**
Urtica
 **Urens* L.—Dune, Guano (abundant).
- CHENOPODIACEAE**
Rhagodia
baccata (Labill.) Moq.—Dune,
 Marsh (depaup.)
Atriplex
Cinerea Pair—Shell (abundant)
 Dune, Marsh.
paludosa R.Br.—Marsh.
 **patula* L.—Shell (probably the
 "Chenopodium" of Campbell).
Salsola Kali L.
- SUAEDA**
Maritima Dum.—Marsh, Shell.
- SALICORNIA**
australis Banks et Sol.—Marsh
 (abundant).
Blackiana Ulbrich—Marsh (to drier
 ground).
- ARTHROCNEMUM**
arbusculum (R.Br.) Moq.—Marsh
 (dominant).
- AIZOACEAE.**
Tetragonia expansa Murr.
Carpobrotus aequilaterus (Haw.)
 N.E.Br.
 (Syn. *Mesembryanthemum aequilaterale*
 Haw.).
- CARYOPHYLLACEAE**
 **Cerastium*
glomeratum Thuill.—Guano (de-
 paup.).
Sagina
apetala L.—Dune (ephem.)
Polycarpon
tetraphyllum L.f.—Dune
 (ephem.)
- CRUCIFERAE**
Cakile maritima Scop.
 var. *edentula* (Hk.) Jord.
- LEGUMINOSAE**
Acacia
Sophorae R.Br.—Dune (S.W., not
 "N.W." of Campbell).
 **Melilotus*
indica All.—Shell (S.E.).
- FRANKENIACEAE**
Frankenia
pauciflora DC.—Marsh (com-
 mon).
- EPACRIDACEAE**
Leucopogon
parviflorus (Andr.) Lindl.—
 Dune (dominant).
- PRIMULACEAE**
 **Anagallis*
arvensis L.—Dune, Guano (abun-
 dant).
Samolus
repens Pers.—Marsh (abundant)

MYOPORACEAE

Myoporum
iusulare R.Br.—Marsh (one
tree on sandy rise).

CUCURBITACEAE

**Cucumis*
myriocarpus Naud.—Dune, Guano
(common).

COMPOSITAE

Olcaria axillaris F. v. M.—(N.W.)
Hclichrysum cinereum (Labill.)
F. v. M.—(N.W.)
Calocephalus Brownii (Cass.) F. v.
M.—(N.W.)

*CARDUUS

pycnocephalus Jacq.—Dune (Pro-
ably the "*C. lanceolatus*" of
Campbell).

*SONCHUS.

oleraceus L.—Shell (S.E.)

CRYPTOGAMS

(excluding Algæ)

Musci

Ceratodon purpureus (L) Brid.—
bare sand.
Tortella

calycina (Schwgr.) Dixon—bare
sand.

Tortula
papillosa Wils.—on *Leucopogon*
trunks.

Zygodon
minutus C. Müll. et Hampe—on
Leucopogon trunks.

Bryum
truncorum Brid.—humus under
Leucopogon.

Lichenes
On trunks and branches of *Leu-*
copogon.

Parmelia
caperata Ach.
perforata Hook.

Physcia
pulverulenta Nyf.

Ramalina
calicaris Fr.
Ecklonii Mont.

Teloschistes
chrysophthalmus Th.Fr.
parietinus (L.)—also on other
wood and rocks.

On Guano rocks:

Lecanora
umbrina Massal.
Candelariella
vitellina Müll.-Arg.

INSECTS COLLECTED AT MUD ISLANDS, PORT
PHILLIP BAY. November 30, 1945.

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National Museum of Victoria.

Order **DERMAPTERA**Family **LABIDURIDAE**

Labidura truncata Kirby

Common under shore debris, especially driftwood. Not found
amongst vegetation above shore level.

Order **HEMIPTERA**Family **CYDNIDAE**

Acatolectus sp. near *piceus*.

A single specimen found just above the shoreline, among debris.